

What Is Claimed Is:

1. A process for removing a lead contaminant from a surface, comprising the steps of:

a (A) applying a liquid-state composition to a surface, <sup>contaminated with</sup> ~~comprising~~ a lead contaminant,

wherein said liquid-state composition, when solidified into a solid-state matrix, possesses a potential lead to solid-state matrix ratio of at least about 0.10, using as a standard Neoprene 400, which possesses a potential lead to solid-state matrix ratio of about 0.9;

(B) allowing said liquid-state composition to solidify into a solid-state matrix, thereby sequestering said lead contaminant in said solid-state matrix; and

(C) removing said solid-state matrix from said surface.

2. The process of claim 1, wherein said liquid-state composition, when solidified into a solid-state matrix, possesses a potential lead to solid-state matrix ratio of at least about 0.25.

3. The process of claim 1, wherein said liquid-state composition, when solidified into a solid-state matrix, possesses a potential lead to solid-state matrix ratio of at least about 0.60.

4. The process of claim 1, wherein said liquid-state composition, when solidified into a solid-state matrix, possesses a potential lead to solid-state matrix ratio of at least about 0.90.

5. The process of claim 1, further comprising the step of detecting said lead contaminant by contacting said contaminant with a contaminant-detecting compound.

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6. The process of claim 5, wherein said contaminant-detecting compound is contained within said liquid-state composition.

7. The process of claim 5, wherein said contaminant is contacted with said contaminant-detecting compound prior to step (A).

8. The process of claim 5, wherein said contaminant is contacted with said contaminant-detecting compound after step (C).

9. The process of claim 5, wherein said contaminant-detecting compound produces one or more changes selected from the group consisting of changes in chemical reactivity, color purity, color hue, opacity, texture, and refractive index.

10. The process of claim 5, wherein said contaminant-detecting compound produces a change which is visible to the naked eye or detectable by an instrument.

11. The process of claim 5, wherein said contaminant-detecting compound is selected from the group consisting of aminohydroxyanthraquinone, benzidine with alkali hypobromite, carminic acid with ammonia, cyclopentanedione bis(meththiosemicarbazone), dibromodihydroxyfluorescein, diphenylcarbazine dimethyl derivative, diphenylthiocarbazone in carbon tetrachloride, gallocyanine, hydroxydiamine-propanetetraacetic acid, hydroxymethylcyclopentenone thiosemicarbazone, [(hydroxyphenyl)iminomethyl]phenol, methyliminodimethylene phosphoric acid, oximino-cyclohexanone thiosemicarbazone, pyridineacetaldehyde benzoylhydrazone, pyridylazonaphththolsulfonic acid, sarcosine xylene blue, sodium rhodizonate, sodium sulfide,  $\text{HO}_3\text{S} - p - \text{C}_6\text{H}_4\text{N} : \text{NCSNHNH} - p - \text{C}_6\text{H}_4\text{SO}_3\text{H}$ ,

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(thienyl)benzothiazoline, thiothenoyltrifluoroacetone, (triazolylazo)naphthol, and xylenol orange.

12. The process of claim 1, further comprising the step of mitigating the toxicity of said lead contaminant by contacting said contaminant with a toxicity-mitigating compound.

13. The process of claim 12, wherein said toxicity-mitigating compound is contained within said liquid-state composition.

14. The process of claim 12, wherein said contaminant is contacted with said toxicity-mitigating compound prior to step (A).

15. The process of claim 12, wherein said toxicity-mitigating compound is selected from the group consisting of S-adenosyl-L-methionine, active carbon, activated alumina,  $\beta$ -alanine, alkali metal sulfides, alkaline  $\text{Na}_2\text{HPO}_4$  with  $\text{CaCl}_2$ , ascorbic acid, 5-azo(4'-5-methyl-3-isoxazolyl)benzenesulfamoyl)- $\beta$ -hydroxyquinoline, 5-azo(5-methoxy-2-pyrimidinyl)benzenesulfamoyl)- $\beta$ -hydroxyquinoline, benzoylthioacetanilide, bentonite, N-[2-[bis(carboxymethyl)amino]ethyl]-N-(2-hydroxyethyl)-glycine, N,N'-bis(o-pyridylmethyl)-1,4,10,13-tetraoxa-7,13-diazacyclooctadecane, 1,2-bis(4-methyl-3,5-dioxo-1-piperazinyl)ethane, calcite, calcium disodium ethylenediaminetetraacetic acid, calcium phytate, N-(o-carboxymethyl)chitosan, Celex 100 [7-(5,5,7,7-tetramethyl-1-octen-3-yl)-8-hydroxyquinoline], cellulose bound ethylenediaminetetraacetic acid, chloromethylated divinylbenzene/styrene copolymers reacted with diethylenetriamine, triethylenetetraamine, or tetraethylenepentamine, clinoptilolite, copolymers of maleic anhydride and polystyryl(diphenyl-phosphine), cyclohexanediaminetetraacetic acid, L-cysteine, Diafloc NP-800, 4,5-dicarboxy-3,6-dithiaoctanedioic acid,

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diethyldithiocarbamate, 2,3-dimercaptosuccinic acid, 2,9-diamino-5,6-dicarboxy-4,7-dithiadecanedioic acid, disodium 3,6-dithia-1,8-octanediol-4,5-dicarboxylate, dithiocarboxylated polyvinylbenzylamine, divinylbenzene/styrene copolymers having  $-\text{CH}_2\text{S}(\text{O})\text{Me}$ ,  $-\text{CH}_2\text{P}(\text{O})(\text{OEt})_2$ ,  $-\text{CH}_2\text{SMe}$  functional groups, diethylenetriaminepentaacetic acid,  $\beta$ -estradiol, ethylenediaminetetramethylenephosphonate, 2,3-epithiopropylmethacrylate copolymers, ferrous sulfide, fulvic acid, 2,5-furandicarboxylic acid, galactaric acid, D-galacturonic acid, glycyrrhizinate, humic acids, hydrated  $\text{Fe}_2\text{O}_3$ , inositoltriphosphate,  $\alpha$ -mercapto- $\beta$ -(3,4-dimethoxy-phenyl)acrylic acid,  $\alpha$ -mercapto- $\beta$ -(2-furyl)acrylic acid,  $\alpha$ -mercapto- $\beta$ -(2-hydroxyphenyl)acrylic acid, N-(2-mercaptopropionyl)glycine, N-methyl-N-dithiocarboxyglucamine, montmorillonite, nitrilotriacetic acid, nitrilotrimethyl phosphonic acid, D-penicillamine,  $\beta$ -1,2-phenylene di- $\alpha$ -mercaptoacrylic acid, poly(vinyl pyridine-1-oxide), N-(8-quinolyl)-p-styrene sulfonamide, sodium bicarbonate, sodium diethyldithiocarbamate, sulfide minerals, sodium phytate, tetraethylenedithiocarbamate on carbon powder, thio cotton, Unithiol, vermiculite and zeolite 4A.

16. The process of claim 1, wherein said liquid-state composition comprises one or more compounds selected from the group comprising acrylonitrile-containing copolymers, acrylonitrile/butadiene/styrene rubbers, butadiene copolymer rubbers, chlorinated butadiene rubbers, butadiene-styrene copolymers, chlorinated butadiene-styrene rubber, chlorinated butyl rubber, chlorinated rubbers, chlorinated isoprene rubber, chlorinated polyethylene, chlorosulfonated polyethylene, chloroprene homo-polymer and copolymers, chlorinated Neoprene rubbers, cellulose ethers, EPDM rubbers, epichlorohydrin rubbers, ethylene oxide/propylene oxide rubbers, isobutylene rubbers,

chlorinated isobutylene rubbers, natural rubber, cis-1,4-polyisoprene, trans-1,4-polyisoprene, Hevea rubber, Gutta Percha rubber, phosphazene rubber, polyacrylate homopolymers and copolymers, polyacrylate copolymers containing acrylic or methacrylic acids, polydimethylsiloxane rubbers, silicone-containing rubbers, polysulfide rubbers, sulfide-containing rubbers, poly(perchloroethylene), poly(vinyl acetate) homopolymer and copolymers, poly(vinyl chloride) homopolymer and copolymers, chlorinated poly(vinyl chlorides), poly(vinyl chloride-vinyl acetate) copolymers, poly(vinyl alcohol), poly(vinyl butyral), poly(vinyl formal), urethane rubbers, polyether urethanes, polyester urethanes, polysulfide urethanes, polyurethane dispersions and chlorinated polyurethanes.

17. The process of claim 1, wherein said liquid-state composition comprises one or more  $T_g$  lowering agents selected from the group comprising cellosolve acetate, disproportionated rosin, hydrocarbon resins, n-butyl carbitol, chlorinated hydrocarbon resins, pine oil, polybutenes, W.D. rosin, rosin esters, tall oil resins, terpene resins, turpentine, N-methyl pyrrolidone, ethylene glycol monobutyl ether, and 1-methoxy-2-propanol.

18. The process of claim 1, further comprising the step of accelerating the solidification of said liquid-state composition into said solid-state matrix by applying to said liquid-state composition, after step (A), a composition comprising a chemical drying agent.

19. The process of claim 18, wherein said chemical drying agent comprises one or more agents selected from the group comprising  $\text{CaCl}_2$ ,  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{ZnCl}_2$ ,  $\text{MgCl}_2$ ,  $\text{Al}_2(\text{SO}_4)_3$ , sodium silicofluoride, ammonium silicofluoride, and potassium silicofluoride, ethyl alcohol, propyl alcohol, isopropyl alcohol, acetone, phosphoric acid,

acetic acid, chloroacetic acid, lactic acid, citric acid, benzoic acid, Triton X-100, Tergitol NPX, Surfynol 420 surfactant, and mixtures thereof.

20. The process of claim 1, further comprising the step of accelerating the solidification of said liquid-state composition into said solid-state matrix by adding to said liquid-state composition a solidifying compound selected from the group consisting of sodium silicofluoride, ammonium silicofluoride, potassium silicofluoride, and mixtures thereof, as a finely ground dispersion, prior to step (A).

21. A process for cleaning a contaminant-containing spill, comprising the steps of:

(A) applying a liquid-state composition to a contaminant-containing spill,

wherein said liquid-state composition, when solidified into a solid-state matrix, sequesters said contaminant;

(B) physically mixing said liquid-state composition with said contaminant-containing spill;

(C) allowing said liquid-state composition to solidify into a solid-state matrix, thereby sequestering said contaminant in said solid-state matrix; and

(D) removing said solid-state matrix.

22. A process for detecting a contaminant on a surface or in a spill, comprising the steps of:

a (A) applying a composition comprising a contaminant-detecting compound to a surface <sup>contaminated with</sup> comprising a contaminant;

(B) allowing said contaminant-detecting compound to react with said contaminant to produce a detectable change.

23. The process of claim 22, wherein said contaminant is selected from the group comprising lead,

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~~comprising the step of adding to said liquid-state composition a solidifying compound.~~

34. The process <sup>B</sup> of claims 33, wherein said solidifying compound is selected from the group consisting of sodium silicofluoride, ammonium silicofluoride, potassium silicofluoride, and mixtures thereof, as a finely-ground dispersion.

<sup>B</sup>  
<sup>a</sup>  
35. A process for removing a contaminant from a surface, wherein said contaminant is selected from the group comprising antimony, arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, ~~formaldehyde~~, and compounds thereof, said process comprising the steps of:

(A) applying a liquid-state composition to a surface, <sup>contaminated with</sup> ~~comprising a contaminant,~~

wherein said liquid-state composition, when solidified, sequesters said contaminant;

(B) allowing said liquid-state composition to solidify into a solid-state matrix, thereby sequestering said contaminant in said solid-state matrix; and

(C) removing said solid-state matrix from said surface.

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antimony, arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, formaldehyde, and compounds thereof.

24. The process of claim 23, wherein said contaminant is lead.

25. The process of claim 24, wherein said contaminant-detecting compound is selected from the group comprising aminohydroxyanthraquinone, benzidine with alkali hypobromite, carminic acid with ammonia, cyclopentanedione bis(meththiosemicarbazone), dibromodihydroxyfluorescein, diphenylcarbazine dimethyl derivative, diphenylthiocarbazine in carbon tetrachloride, gallocyanine, hydroxydiaminepropanetetraacetic acid, hydroxymethylcyclopentenone thiosemicarbazone, [(hydroxyphenyl)iminomethyl]phenol, methyliminodimethylene phosphoric acid, oximinocyclohexanone thiosemicarbazone, pyridineacetaldehyde benzoylhydrazone, pyridylazonaphththolsulfonic acid, sarcosine xyleneol blue, sodium rhodizone, sodium sulfide,  $\text{HO}_3\text{S-p-C}_6\text{H}_4\text{N:NCSNHNH-p-C}_6\text{H}_4\text{SO}_3\text{H}$ , (thienyl)benzothiazoline, thiothenoyltrifluoroacetone, (triazolylazo)naphthol, xyleneol orange.

26. The process of claim 22, wherein said detectable change is visible to the human eye.

27. A process for mitigating the toxicity of a contaminant on a surface or a spill, comprising the steps of:

a (A) applying a composition comprising a toxicity-mitigating compound to a surface or a spill contaminated with a contaminant;

(B) allowing said toxicity-mitigating compound to react with said contaminant to produce a product that is less toxic than said contaminant.



28. The process of claim 27, wherein said contaminant is selected from the group comprising lead, antimony, arsenic, barium, cadmium, chromium, copper, mercury, formaldehyde, radiopharmaceuticals containing molybdenum, radiopharmaceuticals containing Tc-99m, halogenated aromatics, and compounds thereof.

29. The process of claim 27, wherein said contaminant is lead.

30. The process of claim 29, wherein said toxicity-mitigating compound is selected from the group comprising S-adenosyl-L-methionine, active carbon, activated alumina,  $\beta$ -alanine, alkali metal sulfides, alkaline  $\text{Na}_2\text{HPO}_4$  with  $\text{CaCl}_2$ , ascorbic acid, 5-azo(4'-5-methyl-3-isoxazolyl)benzenesulfamoyl)- $\beta$ -hydroxyquinoline, 5-azo(5-methoxy-2-pyrimidinyl)benzenesulfamoyl)- $\beta$ -hydroxyquinoline, benzoylthioacetanilide, bentonite, N-[2-[bis(carboxymethyl)amino]ethyl]-N-(2-hydroxyethyl)-glycine, N,N'-bis(o-pyridylmethyl)-1,4,10,13-tetraoxa-7,13-diazacyclooctadecane, 1,2-bis(4-methyl-3,5-dioxo-1-piperazinyl)ethane, calcite, calcium disodium ethylenediaminetetraacetic acid, calcium phytate, N-(o-carboxymethyl)chitosan, Celex 100 [7-(5,5,7,7-tetramethyl-1-octen-3-yl)-8-hydroxyquinoline], cellulose bound ethylenediaminetetraacetic acid, chloromethylated divinylbenzene/styrene copolymers reacted with diethylenetriamine, triethylenetetraamine, or tetraethylenepentamine, clinoptilolite, copolymers of maleic anhydride and polystyryl(diphenyl-phosphine), cyclohexanediaminetetraacetic acid, L-cysteine, Diafloc NP-800, 4,5-dicarboxy-3,6-dithiaoctanedioic acid, diethyldithiocarbamate, 2,3-dimercaptosuccinic acid, 2,9-diamino-5,6-dicarboxy-4,7-dithiadecanedioic acid, disodium 3,6-dithia-1,8-octanediol-4,5-dicarboxylate, dithiocarboxylated polyvinylbenzylamine, divinylbenzene/styrene copolymers having  ~~$-\text{CH}_2\text{S}(\text{O})\text{Me}$ ,  $-\text{CH}_2\text{P}(\text{O})(\text{OEt})_2$ ,  $-\text{CH}_2\text{SMe}$~~  functional groups,

diethylenetriaminepentaacetic acid,  $\beta$ -estradiol, ethylenediaminetetramethylenephosphonate, 2,3-epithiopropylmethacrylate copolymers, ferrous sulfide, fulvic acid, 2,5-furandicarboxylic acid, galactaric acid, D-galacturonic acid, glycyrrhizinate, humic acids, hydrated  $\text{Fe}_2\text{O}_3$ , inositoltriphosphate,  $\alpha$ -mercapto- $\beta$ -(3,4-dimethoxy-phenyl)acrylic acid,  $\alpha$ -mercapto- $\beta$ -(2-furyl)acrylic acid,  $\alpha$ -mercapto- $\beta$ -(2-hydroxyphenyl)acrylic acid, N-(2-mercaptopropionyl)glycine, N-methyl-N-dithiocarboxyglucamine, montmorillonite, nitrilotriacetic acid, nitrilotrimethyl phosphonic acid, D-penicillamine,  $\beta$ -1,2-phenylene di- $\alpha$ -mercaptoacrylic acid, poly(vinyl pyridine-1-oxide), N-(8-quinolyl)-p-styrene sulfonamide, sodium bicarbonate, sodium diethyldithiocarbamate, sulfide minerals, sodium phytate, tetraethylenedithiocarbamate on carbon powder, thio cotton, Unithiol, vermiculite and zeolite 4A.

31. The process of accelerating the solidification of a liquid-state composition into a solid-state matrix, comprising the step of applying to said liquid-state composition a thin layer of a composition comprising a chemical drying agent.

32. The process of claim 31, wherein said chemical drying agent comprises one or more agents selected from the group comprising  $\text{CaCl}_2$ ,  $\text{Ca}(\text{NO}_3)_2$ ,  $\text{ZnCl}_2$ ,  $\text{MgCl}_2$ ,  $\text{Al}_2(\text{SO}_4)_3$ , sodium silicofluoride, ammonium silicofluoride, and potassium silicofluoride, ethyl alcohol, propyl alcohol, isopropyl alcohol, acetone, phosphoric acid, acetic acid, chloroacetic acid, lactic acid, citric acid, benzoic acid, Triton X-100, Tergitol NPX, Surfynol 420 surfactant, and mixtures thereof.

33. The process of accelerating the solidification of a liquid-state composition into a solid-state matrix,